X Homework – 18 (POLYNOMIALS – MCQs)

1) If 1 is a zero of the polynomial $7x - x^3 - 6$, then other zeroes are:
(a) 1 and 2 (b) 2 and 3 (c) −3 and 2 (d) −2 and −3

2) If $p(x) = 3x^4 + 5x^3 - 7x^2 + 2x + 2$ is divided by $g(x) = x^2 + 3x + 1$, then remainder is
(a) 1 (b) 0 (c) −1 (d) 2

3) On dividing $x^3 - 3x^2 + x + 2$ by a polynomial $g(x)$, the quotient and remainder were $x - 2$ and $-2x + 4$ respectively, then $g(x)$ is
(a) $x^2 + x - 1$ (b) $x^2 - x + 1$ (c) $x^2 + 2x - 2$ (d) $x^2 + 2x + 3$

4) If 2 and −3 are the zeroes of the quadratic polynomial $x^2 + (a+1)x + b$, then the value of $a + b$ is
(a) −5 (b) 0 (c) 6 (d) −6

5) If p and q are the zeroes of $ax^2 - bx + c$, $a \neq 0$, then the value of $p + q$ is
(a) $\frac{b}{a}$ (b) $\frac{c}{a}$ (c) $\frac{d}{a}$ (d) $-\frac{b}{a}$

6) Sum of zeroes of the polynomial $x^3 - 4x$ is:
(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 0 (d) $-\frac{3}{2}$

7) Zeroes of the polynomial $4x^2 - 9$ are:
(a) $\pm\frac{2}{3}$ (b) $\pm\frac{3}{2}$ (c) $\pm\frac{5}{2}$ (d) none of these.

8) The value of k, if −4 is a zero of polynomial $x^2 - x - (2k+2)$ is:
(a) 5 (b) 6 (c) 7 (d) 9

9) If the degree of polynomial $p(x)$ is n, then the maximum number of zeroes it can have is:
(a) n (b) n^2 (c) n^3 (d) none of these

10) If α, β are the zeroes of $x^2 - 6x + k$, then the value of k when $3\alpha + 2\beta = 20$ is:
(a) 13 (b) −14 (c) 15 (d) −16

11) If the sum and the product of the zeroes of the polynomial $p(x) = 4x^2 - 27x + 3k^2$ are equal, then the value of k is:
(a) ±2 (b) ±3 (c) ±5 (d) ±1

12) The value of k such that $3x^2+2kx-k-5$ has the sum of the zeroes as half of their product is:
(a) $\frac{2}{3}$ (b) $\frac{5}{3}$ (c) $\frac{7}{3}$ (d) $\frac{8}{3}$

13) If α and β are the zeroes of the polynomial $p(x)=2x^2+5x+k$ satisfying the relation $\alpha^2+\beta^2+\alpha\beta=\frac{21}{4}$, then the value of k is
(a) 1 (b) 2 (c) 3 (d) 4

14) If α, β and γ are the zeroes of the polynomial px^3-5x+9 and $\alpha^3+\beta^3+\gamma^3=27$, then:
(a) $p=0$ (b) $p=1$ (c) $p=2$ (d) $p=-1$

15) If α and β are the zeroes of the quadratic polynomial x^2-5x+k such that $\alpha-\beta=1$, then $k=$

16) If α and β are the zeroes of the quadratic polynomial $p(x)=ax^2+bx+c$, then $\alpha^3\beta^2+\alpha^2\beta^3=$
(a) $-\frac{bc}{a^3}$ (b) $-\frac{bc^2}{a^3}$ (c) $-\frac{ac}{b^3}$ (d) $-\frac{a^2c}{b^3}$

17) If α and β are the zeroes of the quadratic polynomial $p(x)=ax^2+bx+c$, then $\frac{1}{\alpha}+\frac{1}{\beta}-2\alpha\beta$ is
(a) $-\frac{ab-2c^2}{ac}$ (b) $\frac{ab+2c^2}{ac}$ (c) $\frac{ab+b^2}{2c}$ (d) $\frac{-c^2+ab}{2ac}$

18) If α and β are the zeroes of the quadratic polynomial $p(x)=ax^2+bx+c$, then $\frac{1}{\alpha}+\frac{1}{\beta}$ is
(a) $-\frac{b}{a}$ (b) $\frac{b}{c}$ (c) $-\frac{b}{c}$ (d) $-\frac{a}{b}$

19) If two zeroes of a quadratic polynomial are $5-3\sqrt{2}$ and $5+3\sqrt{2}$, then the quadratic polynomial is:
(a) $x^2-10x-7$ (b) $x^2-10x+6$ (c) $x^2-10x+14$ (d) $x^2-10x+7$

20) If α, β are the zeroes of a polynomial such that $\alpha+\beta=6$ and $\alpha\beta=4$, then the polynomial is
(a) x^2-6x+4 (b) $-x^2+6x-4$ (c) x^2-6x-4 (d) none of these

X | Homework-18 (Polynomials - MCQs)

1) Since 1 is a zero of $p(x) = -x^3 + 0x^2 + 7x - 6$, then $(x-1)$ is a factor of $p(x)$.
On dividing $p(x)$ by $(x-1)$,

$$\begin{array}{r} -x^2 - x + 6 \\ x-1 \overline{)\, -x^3 + 0x^2 + 7x - 6} \\ \underline{-x^3 + x^2} \\ -x^2 + 7x - 6 \\ \underline{-x^2 + x} \\ 6x - 6 \\ \underline{6x - 6} \\ 0 \end{array}$$

Using division algorithm,
$p(x) = (x-1)(-x^2 - x + 6)$
$= (x-1)(-x^2 - 3x + 2x + 6)$
$= (x-1)[-x(x+3) + 2(x+3)]$
$= (x-1)(2-x)(x+3)$

S	P
-1	-6
	$-3, 2$

$\therefore$ The other zeroes $= -3$ and 2 (c)

2) On dividing $p(x)$ by $g(x)$,

$$\begin{array}{r} 3x^2 - 4x + 2 \\ x^2 + 3x + 1 \overline{)\, 3x^4 + 5x^3 - 7x^2 + 2x + 2} \\ \underline{3x^4 + 9x^3 + 3x^2} \\ -4x^3 - 10x^2 + 2x + 2 \\ \underline{-4x^3 - 12x^2 - 4x} \\ 2x^2 + 6x + 2 \\ \underline{2x^2 + 6x + 2} \\ 0 \end{array}$$

$\therefore$ Remainder $= 0$ (b)

3) Dividend = divisor $\times$ quotient + remainder
$x^3 - 3x^2 + x + 2 = (x-2) \times g(x) - 2x + 4$
$x^3 - 3x^2 + x + 2 + 2x - 4 = (x-2) \times g(x)$
$\therefore g(x) = \dfrac{x^3 - 3x^2 + 3x - 2}{x-2}$

On dividing,

$$\begin{array}{r} x^2 - x + 1 \\ x-2 \overline{)\, x^3 - 3x^2 + 3x - 2} \\ \underline{x^3 - 2x^2} \\ -x^2 + 3x - 2 \\ \underline{-x^2 + 2x} \\ x - 2 \\ \underline{x - 2} \\ 0 \end{array}$$

$\therefore g(x) = x^2 - x + 1$ (b)

4) Let $p(x) = x^2 + (a+1)x + b$

$p(2) = 0 \Rightarrow 4 + 2(a+1) + b = 0$

$\Rightarrow 4 + 2a + 2 + b = 0$

$\Rightarrow 2a + b = -6 \longrightarrow (1)$

$p(-3) = 0 \Rightarrow 9 - 3(a+1) + b = 0$

$\Rightarrow 9 - 3a - 3 + b = 0$

$\Rightarrow -3a + b = -6 \longrightarrow (2)$

$(1) - (2)$, $5a = 0$

$\underline{\underline{a = 0}}$

From eq: (1), $\underline{\underline{b = -6}}$

$\therefore a + b = -6$ (d)

5) Let $p(x) = ax^2 - bx + c$

$p + q = -\frac{(-b)}{a} = \frac{b}{a}$ (a)

6) $x^3 - 4x = 0$

$\Rightarrow x(x^2 - 4) = 0$

$x = 0, x = \pm 2$

$\therefore$ Sum of zeros $= 0 + 2 - 2 = 0$ (c)

7) $4x^2 - 9 = 0$

$x^2 = \frac{9}{4}$

$x = \pm \underline{\underline{\frac{3}{2}}}$ (b)

8) $x^2 - x - (2k+2) = 0$

$(-4)^2 + 4 - 2k - 2 = 0$

$16 + 4 - 2k - 2 = 0$

$-2k + 18 = 0$

$-2k = -18$

$k = \underline{\underline{9}}$ (d)

9) n (a)

10) $\alpha + \beta = -\frac{b}{a} = 6$; $\alpha\beta = \frac{c}{a} = k$

$3\alpha + 2\beta = 20 \Rightarrow \alpha + 2\alpha + 2\beta = 20$

$\Rightarrow \alpha + 2(\alpha + \beta) = 20$

$\alpha + 12 = 20$

$\alpha = 8$; $\beta = -2$

$\therefore k = \alpha\beta = -16$ (d)

11) Sum of zeroes $= -\frac{b}{a} = \frac{27}{4}$

Product of zeroes $= \frac{c}{a} = \frac{3k^2}{4}$

$\therefore \frac{27}{4_1} = \frac{3k^2}{4_1}$

$k^2 = 9$

$k = \pm 3$ (b)

12) Sum of zeroes $= -\frac{b}{a} = \frac{-2k}{3}$

Product of zeroes $= \frac{c}{a} = \frac{-k-5}{3}$

$\therefore \frac{-2k}{3_1} = \frac{1}{2} \times \frac{-k-5}{3_1}$

$-4k = -k-5$

$-3k = -5$

$k = \frac{5}{3}$ (b)

13) $\alpha+\beta = \frac{-b}{a} = -\frac{5}{2}$

$\alpha\beta = \frac{c}{a} = \frac{k}{2}$

$\alpha^2+\beta^2+\alpha\beta = \frac{21}{4}$

$\Rightarrow (\alpha+\beta)^2 - 2\alpha\beta + \alpha\beta = \frac{21}{4}$

$\Rightarrow (\alpha+\beta)^2 - \alpha\beta = \frac{21}{4}$

$\Rightarrow \frac{25}{4} - \frac{k}{2} = \frac{21}{4}$

$\Rightarrow -\frac{k}{2} = \frac{21}{4} - \frac{25}{4}$

$\Rightarrow -\frac{k}{2} = -\frac{4_1}{4_1}$

$\therefore k = 2$ (b)

14) $a^3+b^3+c^3 = 3abc$ if $a+b+c=0$

$p(x) = px^3+0x^2-5x+9$

$\alpha+\beta+\gamma = -\frac{b}{a} = \frac{0}{p} = 0$

$\alpha\beta\gamma = -\frac{d}{a} = -\frac{9}{p}$

$\therefore \alpha^3+\beta^3+\gamma^3 = 3\alpha\beta\gamma = 27$

$\Rightarrow 3\times -\frac{9}{p} = 27$

$\Rightarrow -\frac{27}{p} = 27$

$\therefore p = -1$ (d)

15) $\alpha+\beta = -\frac{b}{a} = 5$

$\alpha\beta = \frac{c}{a} = k$

$(\alpha+\beta)^2 = (\alpha-\beta)^2 + 4\alpha\beta$

$\Rightarrow 25 = 1+4k$

$\Rightarrow 24 = 4k$

$\therefore k = 6$

16) $\alpha+\beta = -\frac{b}{a}$; $\alpha\beta = \frac{c}{a}$

$\alpha^3\beta^2+\alpha^2\beta^3 = \alpha^2\beta^2(\alpha+\beta)$

$= \left(\frac{c}{a}\right)^2 \times -\frac{b}{a} = \frac{c^2}{a^2}\times -\frac{b}{a} = -\frac{bc^2}{a^3}$ (b)

17) $\alpha+\beta = -\frac{b}{a}$; $\alpha\beta = \frac{c}{a}$

$\frac{1}{\alpha}+\frac{1}{\beta}-2\alpha\beta = \frac{\beta+\alpha}{\alpha\beta} - 2\alpha\beta = -\frac{b}{a\times c}\times a - 2\times\frac{c}{a}$

$= -\frac{b\times a}{c\times a} - \frac{2c\times c}{a\times c} = -\frac{ab-2c^2}{ac}$ (a)

18) $\alpha+\beta = -\frac{b}{a}$; $\alpha\beta = \frac{c}{a}$ | $\frac{1}{\alpha}+\frac{1}{\beta} = \frac{\beta+\alpha}{\alpha\beta} = -\frac{b}{a}\times\frac{a}{c} = -\frac{b}{c}$ (c)

19) Sum of zeroes $= 5-3\sqrt{2}+5+3\sqrt{2}$

$= \underline{10}$

product of zeroes $= (5-3\sqrt{2})(5+3\sqrt{2})$

$= 25-18 = \underline{7}$

$\therefore x^2-10x+7$ (d)

20) polynomial is x^2-6x+4 (a)
